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United States Department of Agriculture,

U. S. BUREAU OF ANIMAL INDUSTRY

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DANGER FROM PRODUCTS OF TUBERCULOUS CATTLE

The following conclusions taken from recent publications of the Bureau of Animal Industry are presented for the information of the public in regard to the danger from the products of tuberculous cattle:

[From Bulletin 44, "Infectiveness of Milk of Cows which have Reacted to the Tuberculin Test," by Dr. John R. Mohler.]

1. The tubercle bacillus may be demonstrated in milk from tuberculous cows when the udders show no perceptible evidence of disease, either macroscopically or microscopically.
2. The bacillus of tuberculosis may be excreted from such an udder in sufficient numbers to produce infection in experimental animals both by ingestion and inoculation.
3. That in cows suffering from tuberculosis the udder may, therefore, become affected at any moment.
4. The presence of the tubercle bacillus in the milk of tuberculous cows is not constant, but varies from day to day.
5. Cows secreting virulent milk may be affected with tuberculosis to a degree that can be detected only by the tuberculin test.
6. The physical examination or general appearance of the animal can not foretell the infectiveness of the milk.
7. The milk of all cows which have reacted to the tuberculin test should be considered as suspicious, and should be subjected to pasteurization before using.
8. Still better, tuberculous cows should not be used for general dairy purposes.

[From Circular 118, "The Unsuspected but Dangerously Tuberculous Cow," by Dr. E. C. Schroeder.]

1. The dangerously tuberculous cow is an animal that may long retain the appearance and general semblance of perfect health.
2. The methods we now have to detect the presence of tubercle bacilli in the secretions and discharges from tuberculous cows are too crude to give positive results unless the bacilli are quite numerous; hence, while we can frequently obtain direct evidence that a tuberculous cow is dangerous, the failure to obtain such evidence does not prove that a tuberculous cow is safe.
3. Among tuberculous dairy cows that retain the appearance of health and are not known to be affected until they are tested with tuberculin, 40 per cent or more actively expel tubercle bacilli from their bodies in a way dangerous to the health of other animals and persons.
4. Dairy cows that have been affected with tuberculosis three years or more, with possibly rare exceptions, are active agents for the dissemination of tubercle bacilli.

5. The general evidence justifies the conclusion that tuberculous cows do not expel tubercle bacilli until some time after they contract the affection. The practical importance of this is that it enables us to clean herds of tuberculous cattle by the periodic application of the tuberculin test and the segregation of all reacting animals.

6. The interval of time that elapses between infection with tuberculosis and the dangerous expulsion of tubercle bacilli can not serve as a reason for retaining a tuberculous cow in a dairy herd after the fact that she is tuberculous has been determined. The duration of the interval after infection, before the expulsion of bacilli begins, varies greatly with different animals, and it is rarely possible to ascertain how long a cow has been affected when her tuberculous condition is first discovered.

7. From the present as well as from former investigations we know that the commonest way for tubercle bacilli to pass from the bodies of tuberculous cows is with their feces. This fact, together with the common presence of tuberculosis among dairy cows and the frequency with which cow feces are found in the milk that reaches the consumer, is clear evidence that a considerable proportion of our dairy products are infected with tubercle bacilli.

8. The danger from the presence of tuberculosis among dairy cows is not confined to the use of milk as a beverage. When tubercle bacilli are present in milk they enter the various articles of diet prepared from it, and are specially numerous in butter, in which they may remain alive seven weeks or longer without showing a diminution of virulence.

9. The distribution of tubercle bacilli from tuberculous cattle in a way to endanger human health is not left to chance. It is a commercial, systematic distribution, from door to door, or rather from table to table. As long as the use of tuberculous dairy cows is permitted the manner in which dairy products are distributed will insure that practically every member of the human family is exposed to tuberculosis. This may explain why three European investigators from their post-mortem examinations of respectively 1,452, 500, and 100 bodies of persons who died from various causes found that, among this total of 2,052 bodies, no less than 91 per cent showed lesions of tuberculosis.

10. While the danger to which public health is exposed through the use of milk from tuberculous cows is of a magnitude almost beyond conception, it is unfortunately only one among many dangers to which persons are exposed through the use of impure, infected, and dirty milk.

11. If the inclination of the general public does not drive it to correct the evils to which it is exposed through the use of impure, infected, and dirty milk, it should bear in mind that common humanity imposes various sacred obligations, among which pure, wholesome milk for children ranks near to the first place. We have no right to shirk this obligation, and would have no inclination to shirk or ignore it if we took the time and trouble to investigate the number of deaths, especially among infants, directly due to contaminated milk. Most intelligent persons who read have some knowledge of the fact that numerous babies die from no other cause than the use of impure milk. Unfortunately the frequency with which milk from tuberculous cows causes tuberculosis is not so clearly apparent, because of the insidious, chronic character of the affection.

12. Our dairy herds can be cleaned of tuberculous cows by the proper application of the tuberculin test and the segregation of all reacting animals. After years of observation the tuberculin test has been found to

be a more nearly infallible means for diagnosing tuberculosis than any we have for diagnosing other diseases of men and animals.

[From Bulletin 96, "A Comparative Study of Tuberclle Bacilli from Varied Sources," by Drs. John R. Mohler and Henry J. Washburn.]

1. While certain peculiarities of growth, form, and virulence are observed with a fair degree of constancy in bacilli of human origin, nevertheless these characteristics are not universal, and notable exceptions are observed which would confuse those who would attempt to establish their origin by means of such characteristics.

2. A similar degree of constancy in the characters of form, biology, and virulence of the bovine bacillus is generally noted, but a certain range of differences has been observed, which, though apparently more limited than for the human bacillus, is nevertheless suggestive of transition forms.

3. Therefore the assertion, based solely on these facts, that a bacillus has a certain origin can only be tentative, as bacilli from man have been found which conform in all respects to bacilli obtained from cattle.

4. Tuberclle bacilli of widely different virulence may be encountered in different cases of bovine as well as of human tuberculosis.

5. There is a certain proportion of cases of human tuberculosis in which may be found tuberclle bacilli which are pathogenic for cattle.

6. Dependent upon the medium in which grown, tuberclle bacilli will present special characteristics in accordance with their different environment, and these characteristics may lead to a supposition relative to their origin, although they are not always fixed or unchangeable.

7. The numerous instances above recorded in which the inoculation of cattle with tuberclle bacilli from human sources has resulted in the production of tuberculosis must prove decisively that tuberclle bacilli of human origin have been deadly to the bovine, or, on the other hand, the bacilli must have been bovine in origin, and in spite of this fact were readily able to obtain a footing within the human tissues, in either case demonstrating the transmissibility of the differing types from one species of mammals to another.

8. The more the subject is studied the more numerous are the instances noted in which the bacilli appear naturally in animals that are far removed from the species supposed to be their usual host, thus proving that they are not closely limited in their choice of victims and that there is no character possessed by any of these types of tuberclle bacilli in one host that may not be found in another host under favoring conditions.

9. Upon examination of the results obtained from inoculating bacilli marked "Boy V" in this experiment it will be at once noticed that it possesses a remarkable degree of virulence, in this respect surpassing many that we have obtained from bovine sources. Culturally, morphologically, and pathogenically this culture conforms closely to the bovine type. Could it be shown to have originated, previous to its attack upon the boy, from a bovine source, its fatal effects upon the child's system would offer incontestable proof of the susceptibility of the human organism to the inroads of the bovine tuberclle bacillus. If, on the other hand, the bacilli for many generations past have successively grown upon human hosts only, we must at once admit that in this instance the type approaches so closely to the bovine form that all of the prominent characteristic differences between them have been

removed, and we have before us a tubercle bacillus of human origin that has become so modified by peculiar environment that it is no longer a representative except in name.

10. There are human types of bacilli that are similar in morphology and biology, but vary as to their virulence; and, conversely, there are bovine bacilli typical as to form and growth, but less pathogenic than those usually observed.

11. If we exclude culture BB, which has already been included in Ravenel's description of bovine organisms obtained from human tissues, it will be observed that of four cultures obtained from children, one gave all the known reactions to the various tests applied for placing it in the bovine class.¹ It will also be noted that of nine cultures of bacilli obtained from sputa, one was entirely beyond the virulence possessed by the others, although not so pathogenic as some organisms coming from bovine animals, but nevertheless indicating the difference in degree of virulence among sputa bacilli. Of the eight germs obtained from cattle, hogs, and sheep, one was observed which had a modified strength when compared with the high virulence of the others tested, again illustrating the lack of uniformity in bovine germs.

12. The question of the transmissibility of tubercle bacilli of bovine origin to man will not be here further discussed from these experiments; but sufficient evidence, in our judgment, has been adduced to warrant the adoption and enforcement of sanitary measures against the use of the meat and the milk of tuberculous animals, and to make it advisable to eliminate all tuberculous cattle from the herd or to sterilize all the milk therefrom. While the greatest amount of tuberculosis in man is undoubtedly caused by its spread from human to human, the frequency of his infection from animals should not be underestimated.

¹ Cultures of tubercle bacilli from the mesenteric lymph nodes of five children affected with infantile tuberculosis have been studied since the above work was performed, with the result that one was found of the bovine type, thus making two out of the nine cases of tuberculous children studied in this laboratory that were affected with bovine tubercle bacilli.

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